Projection

Prerequisite/Recapitulations

- Basics of Engineering Graphics
- Drawing, Sketching

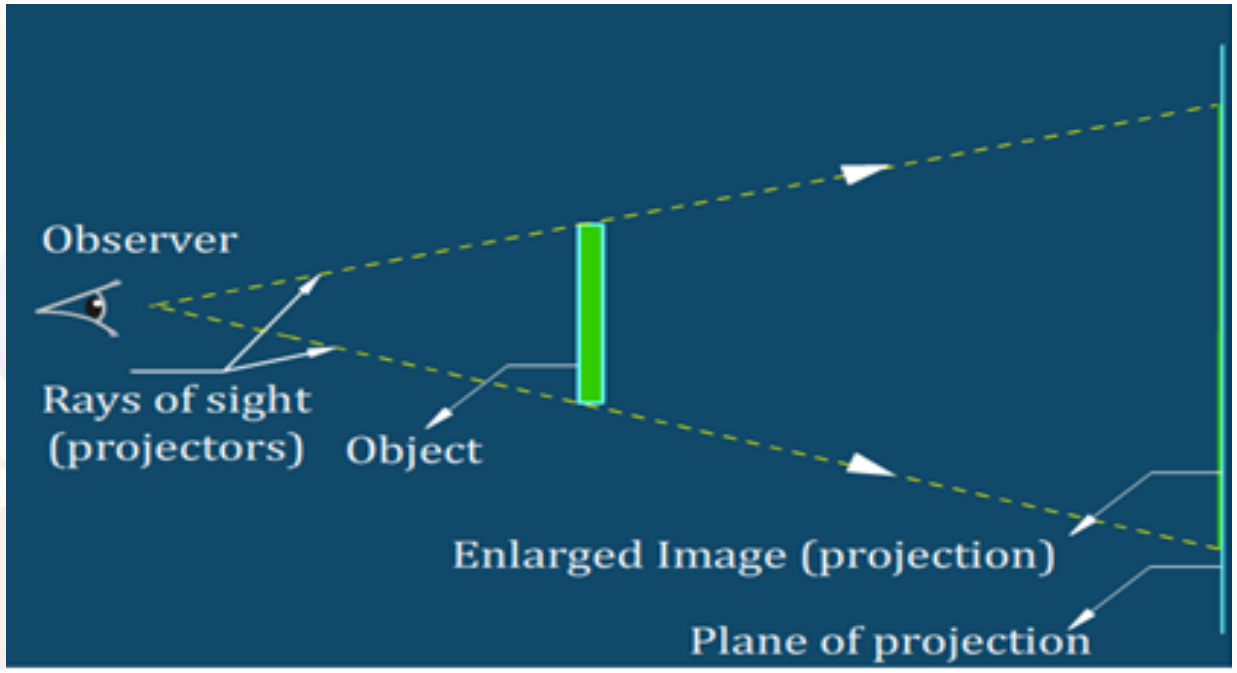
Objectives

To acquire knowledge about:

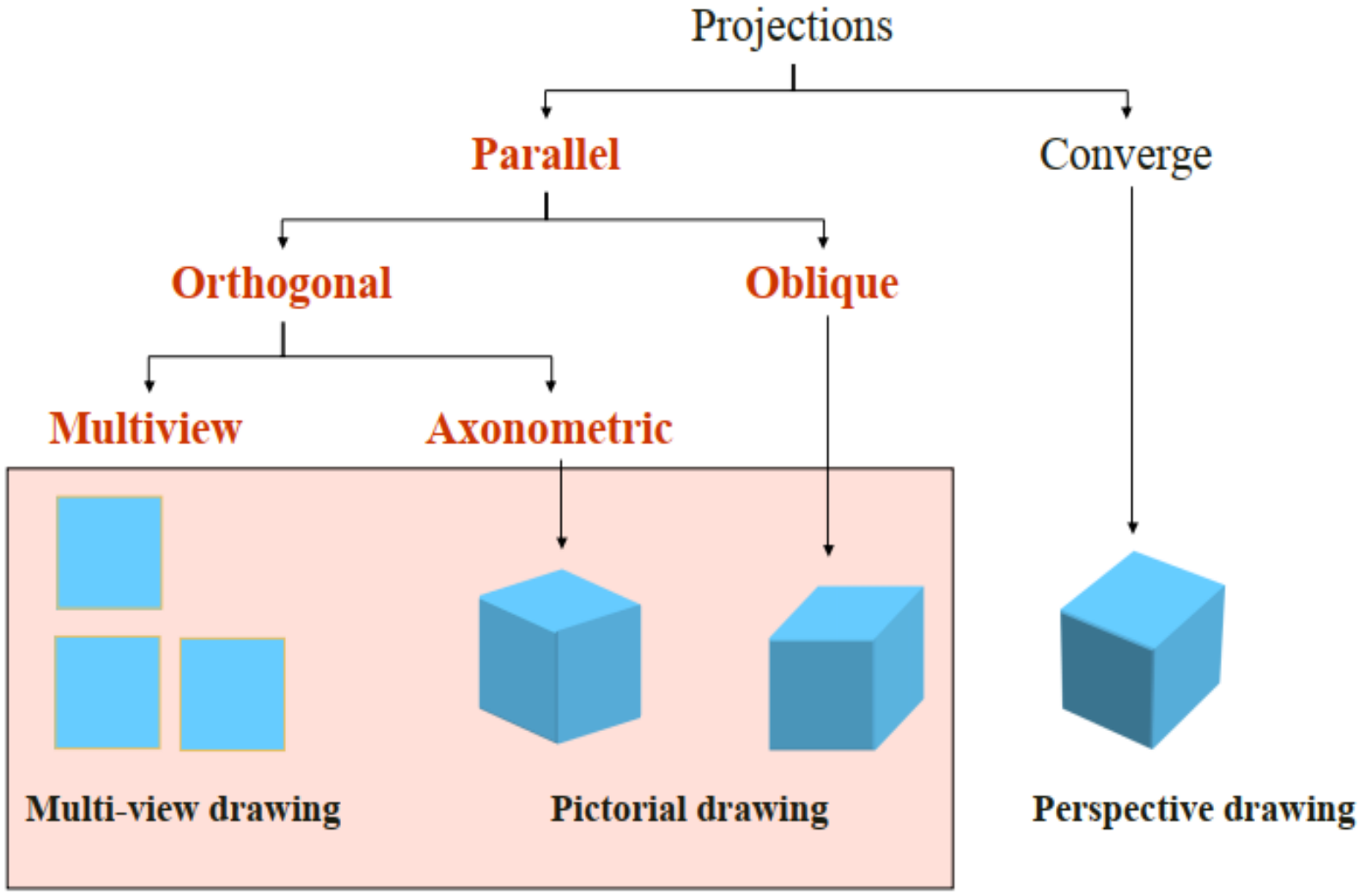
- Introduction to Projection
- Types of Projection
- View comparison
- Orthographic Projection
- Projection Systems
- Projection Symbols

Introduction to Projection

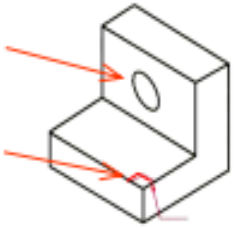
- Any kind of representation of an object on a paper, screen or similar surface by drawing or by photography is called the projection of that object.
- Or, when ray of sights (projectors) are drawn from the eyes of the observer and are extended to fall on a plane of projection the object is said to be projected the image obtained is called projection. The size of image depends upon the position of the plane with respect to the object.
- **PROJECTORS:** The imaginary line from block (object) to the plane is called projectors.
- **PLANE:** The flat surface (such as a sheet of paper) is a plane.
- **PLANE OF PROJECTION**: The plane which is used for the purpose of projection is called plane of projection.



Types of Projection

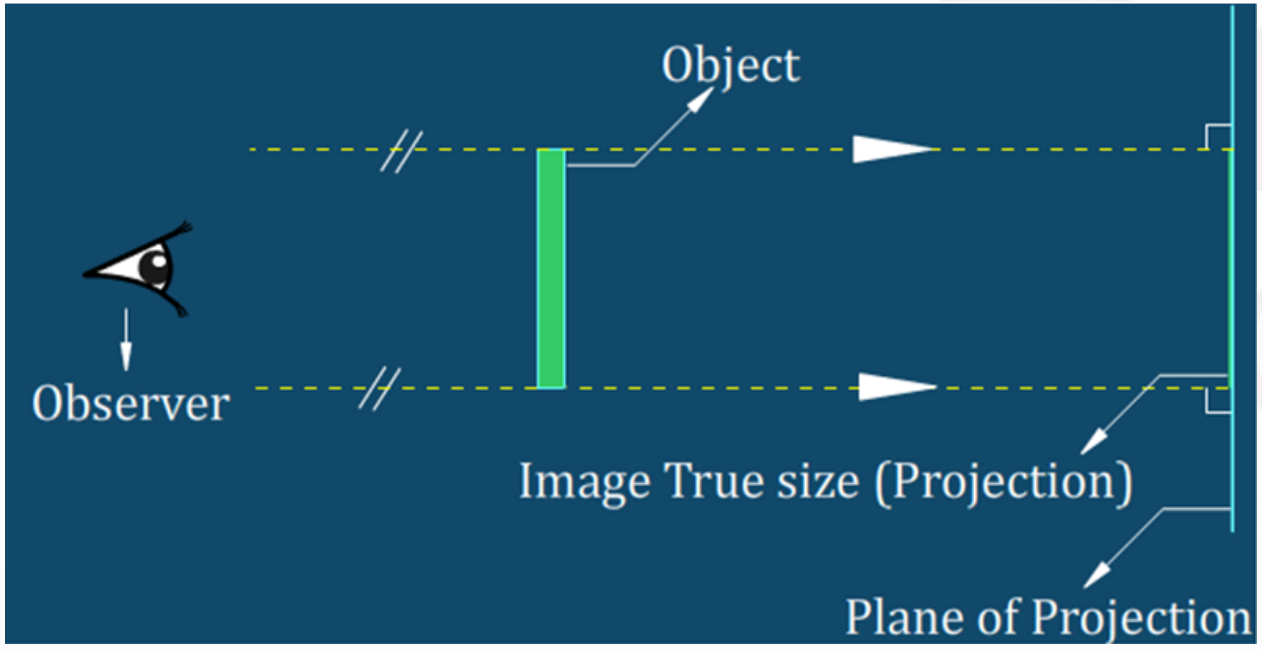


View comparison

Type		
Multi-view drawing	● Accurately presents object's details, i.e. size and shape.	● Require training to visualization.
Pictorial drawing	● Easy to visualize.	● Shape and angle distortion 
Perspective drawing	● Object looks more like what our eyes perceive.	● Difficult to create ● Size and shape distortion

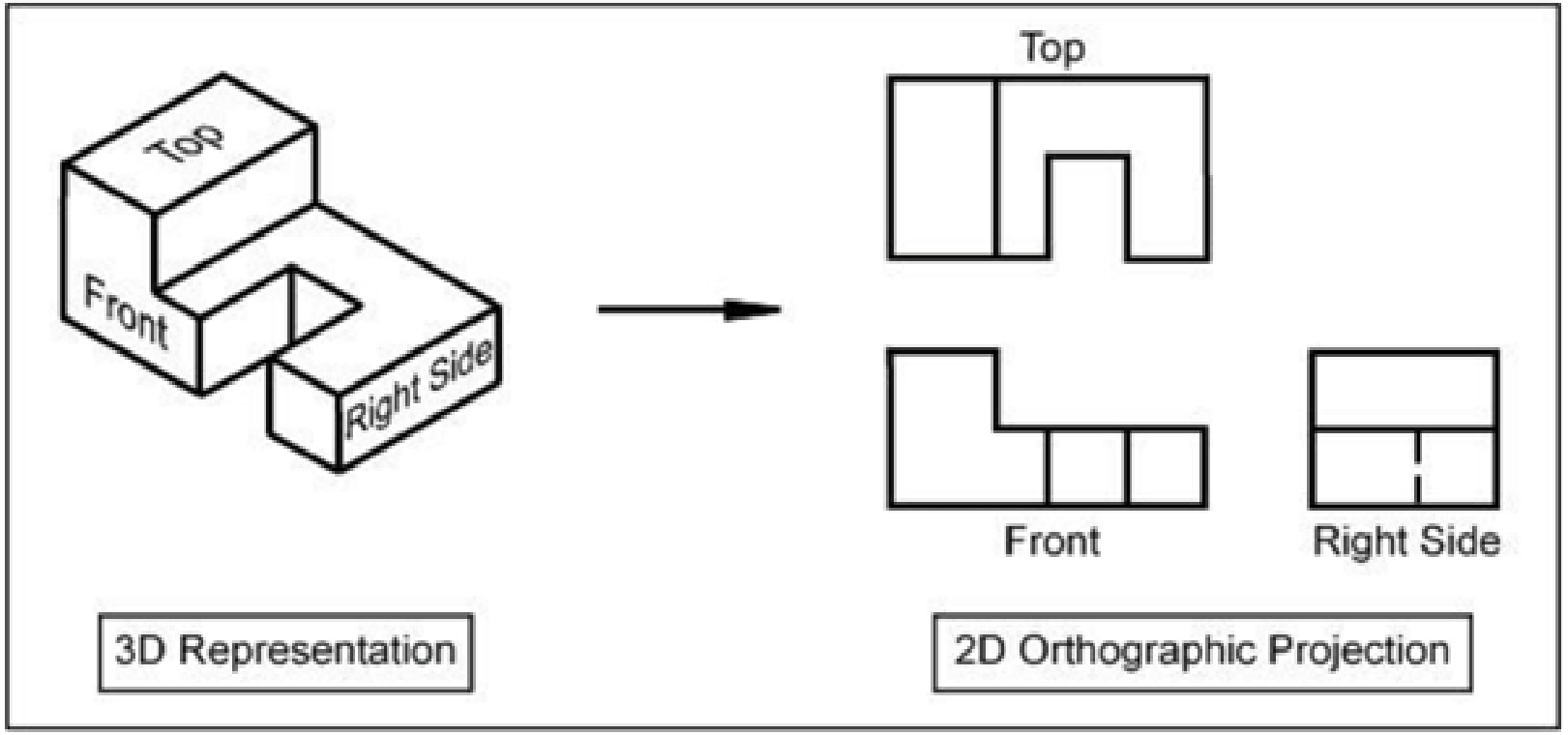
Orthographic Projection

- When projectors are parallel to each other and perpendicular to the plane is called orthographic projection
- Or, Ortho means perpendicular right angles graphics means right angle drawing
- a technical drawing in which different views of an object are projected on different reference planes observing perpendicular to respective reference plane



Orthographic Drawing

- A method used to show or represent the concept and design of a three dimensional object on a two dimensional piece of paper
- The orthographic projections drawn would be used to allow the actual design to be manufactured
- You draw the object in a minimum of three different angles in order to show or represent the object in real life

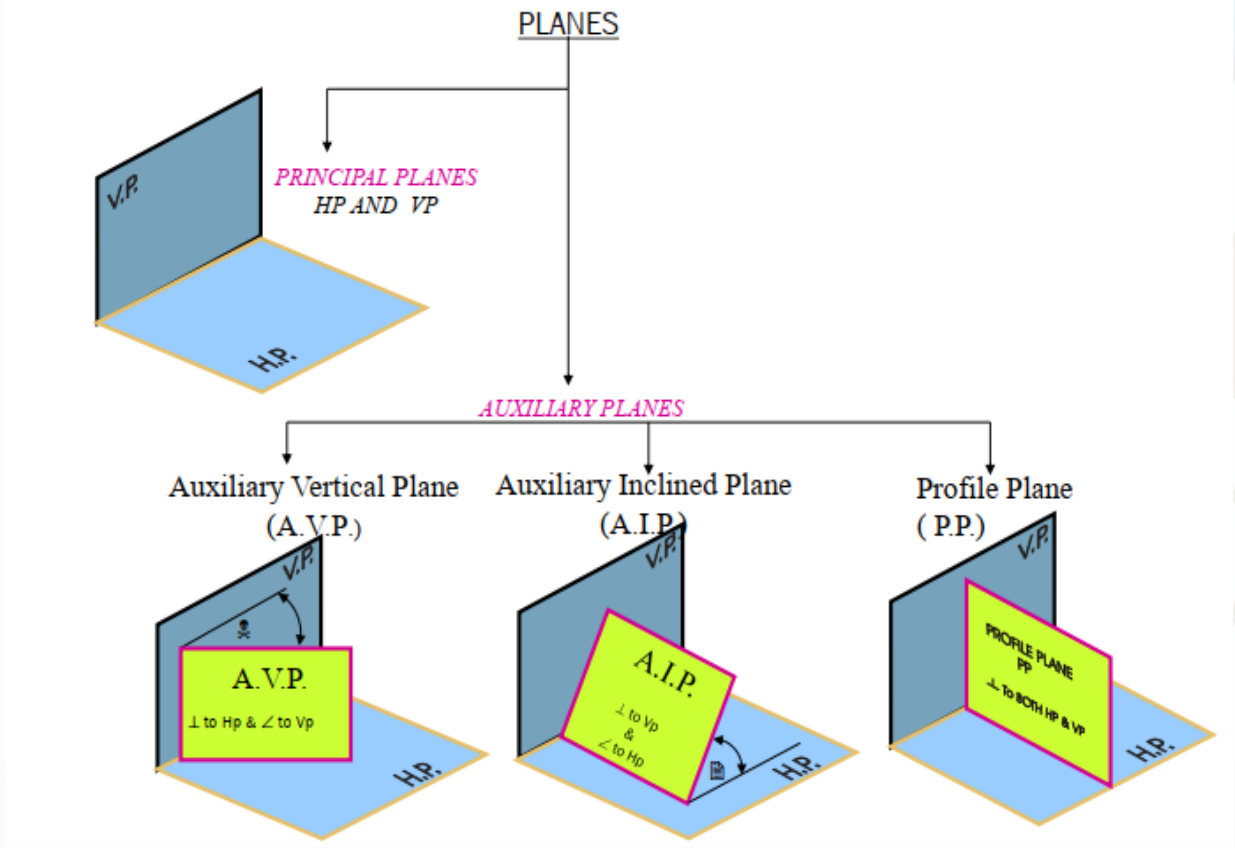


Isometric Drawing

2D Orthographic Projection

Reference Planes

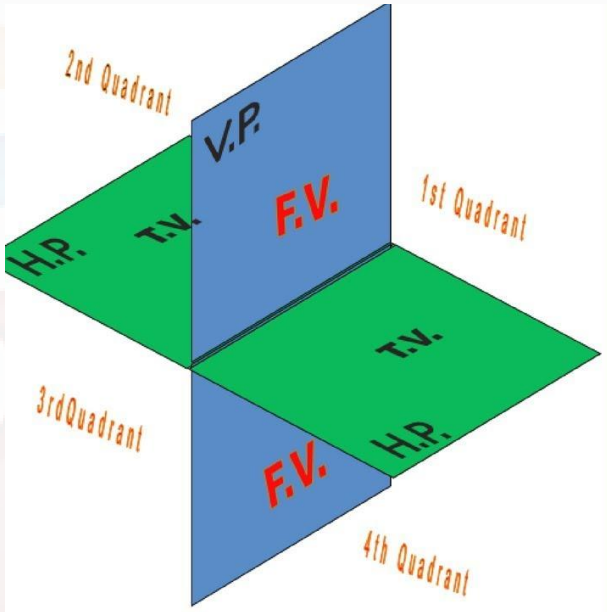
- Horizontal Plane (HP)
- Vertical Plane (VP)
- Side or Profile Plane (PP)



Different Views & Notations

– *Front View (FV) – Projected on VP*
– *Top View (TV) – Projected on HP*
– *Side View (SV) – Projected on PP*

OBJECT	POINT A	LINE AB
IT'S TOP VIEW	a	a b
IT'S FRONT VIEW	a′	a′ b′
IT'S SIDE VIEW	a″	a″ b″

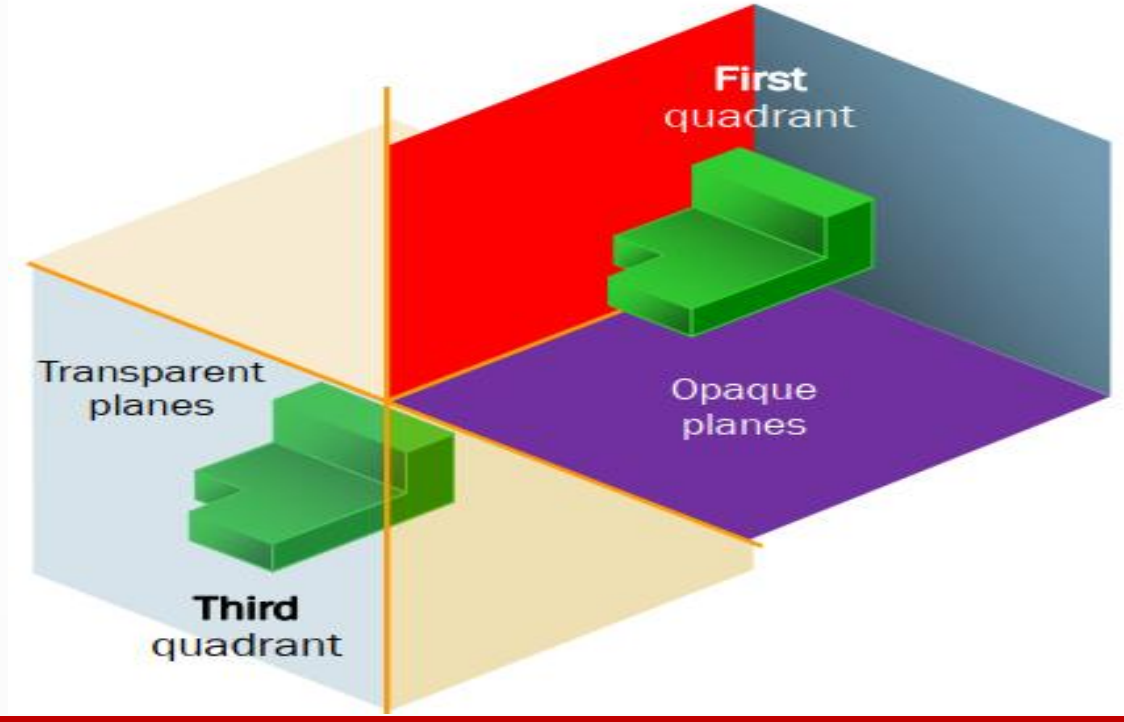


REFERENCE PLANE

UNDERSTAND QUADRANTS

Projection systems

1. First angle system (SETUP:-OBSERVER----OBJECT----PLANE OF PROJECTION)
   - European countries
   - ISO standard
2. Third angle system (SETUP:-OBSERVER----PLANE OF PROJECTION----OBJECT)
   - Canada, USA, Japan, Thailand



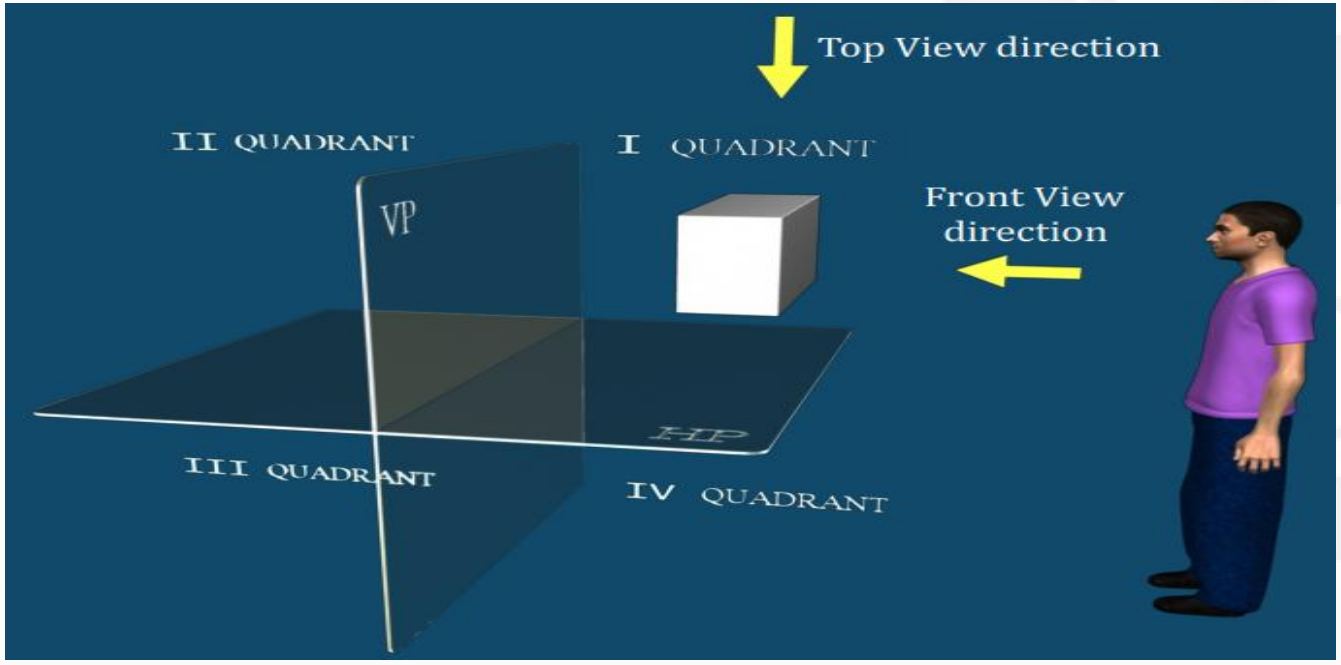
First Angle Projection

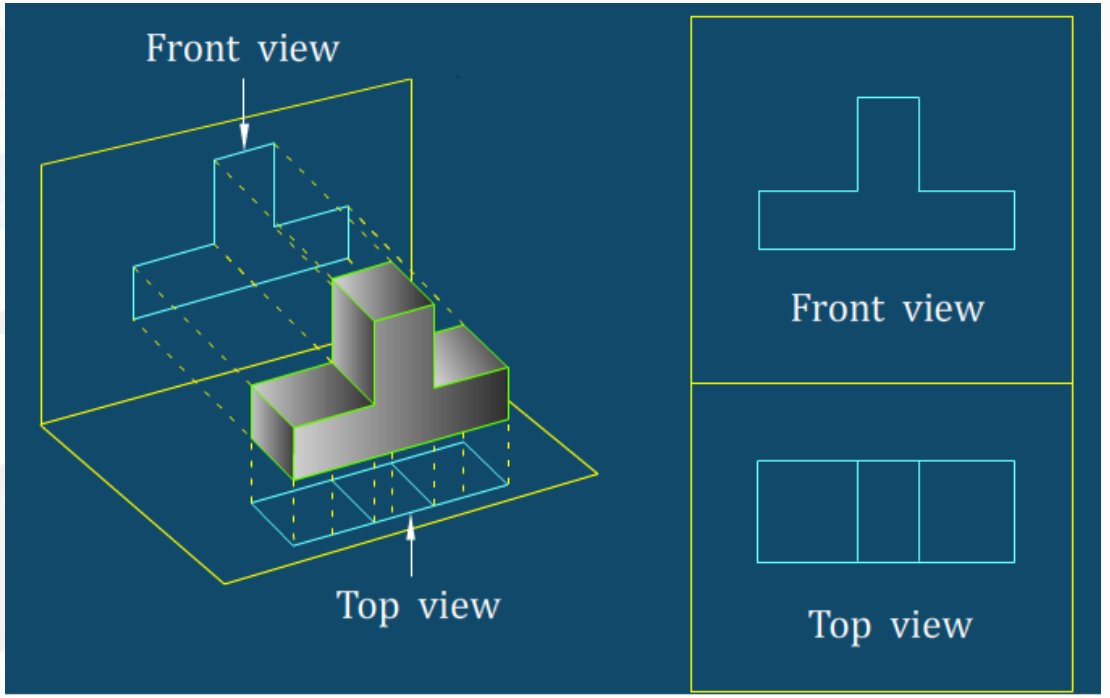
ROTATION OF PLANES:-

When the projection of an object has been made on the various planes they are brought together on a single sheet of paper by rotating the planes.

The standard practice of rotation of planes is to be keeping the VP fixed & to rotate the HP & PP in clock wise direction away from the object so that they may come in line with VP. The 1st & 3rd quadrant opened out while rotating the plane.

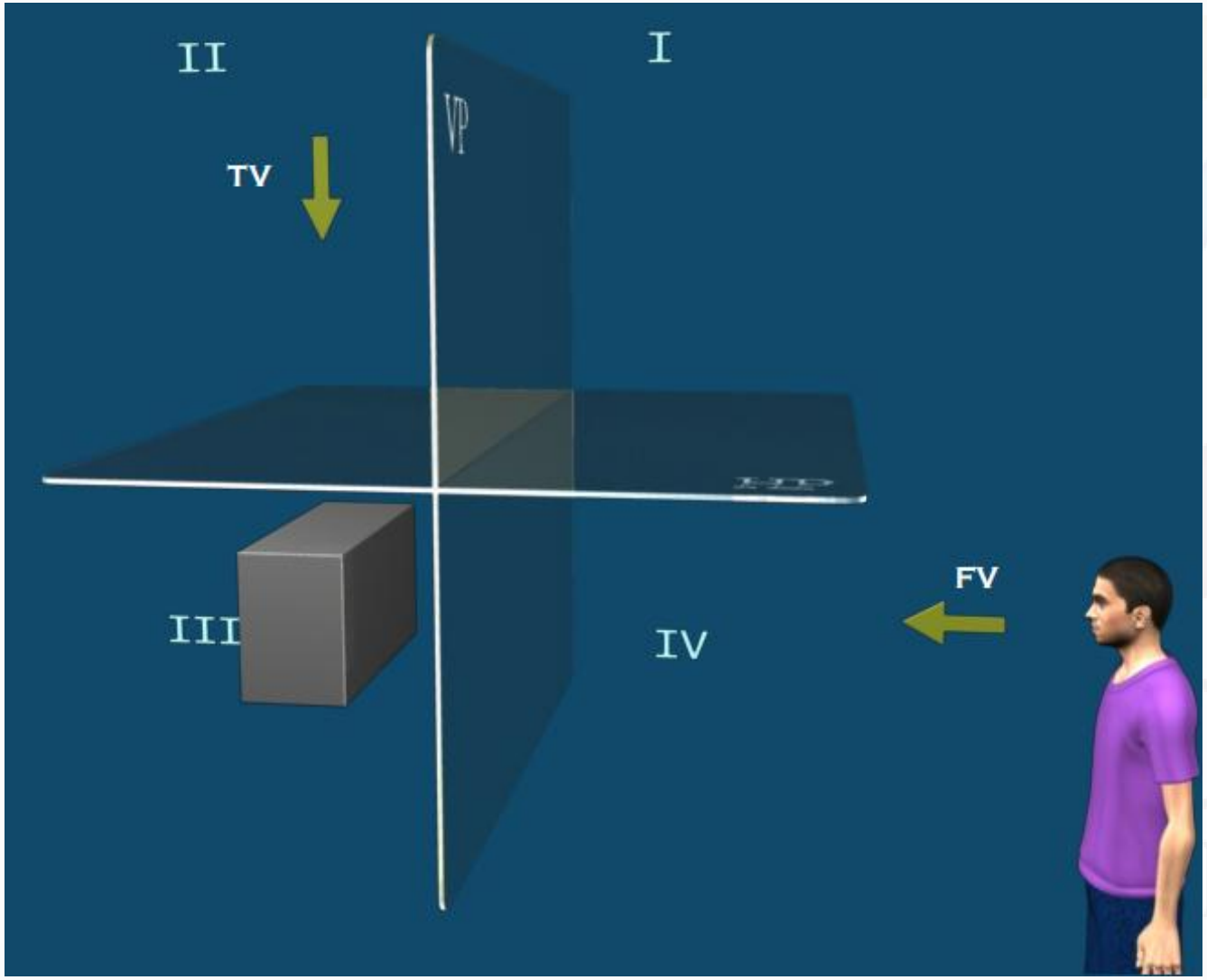
NOTE:-2ND & 4TH quadrant are not used since the FV & TV come(projected)on the same side of xy line & may overlap the view (FV & TV).so 2nd & 4th angles are not used In engineering drawing.

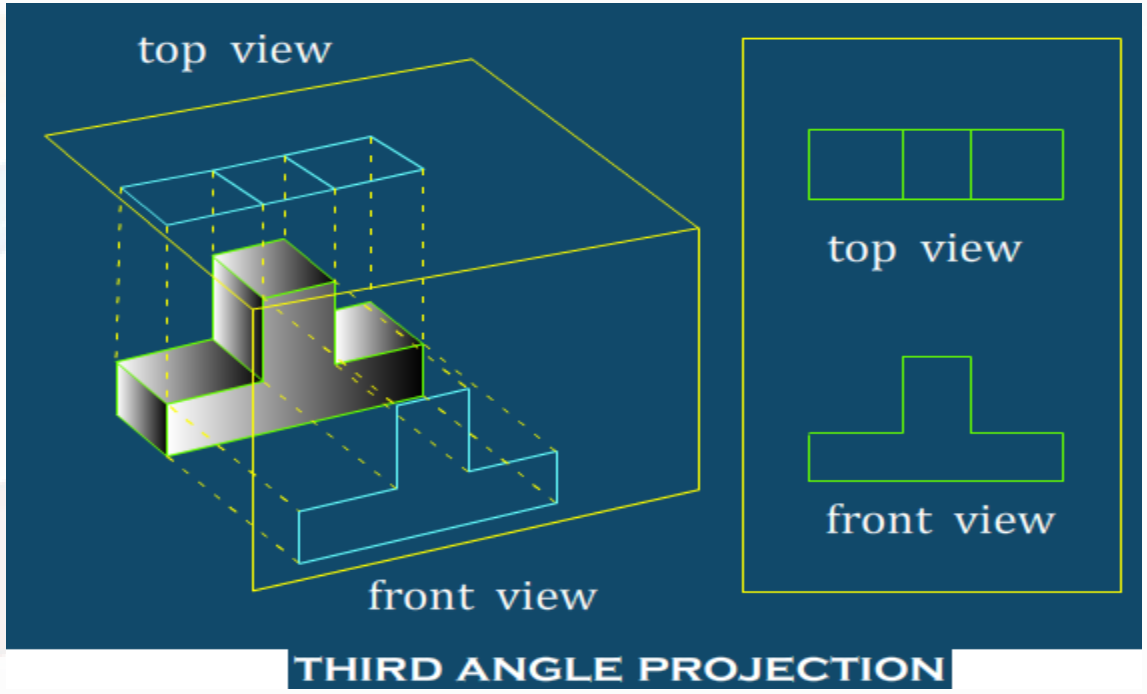




FIRST ANGLE PROJECTION

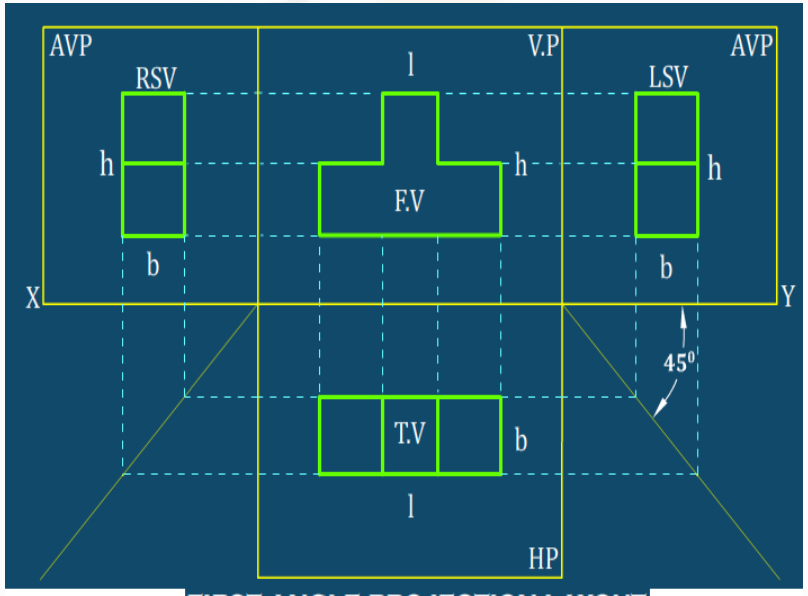
Third Angle Projection



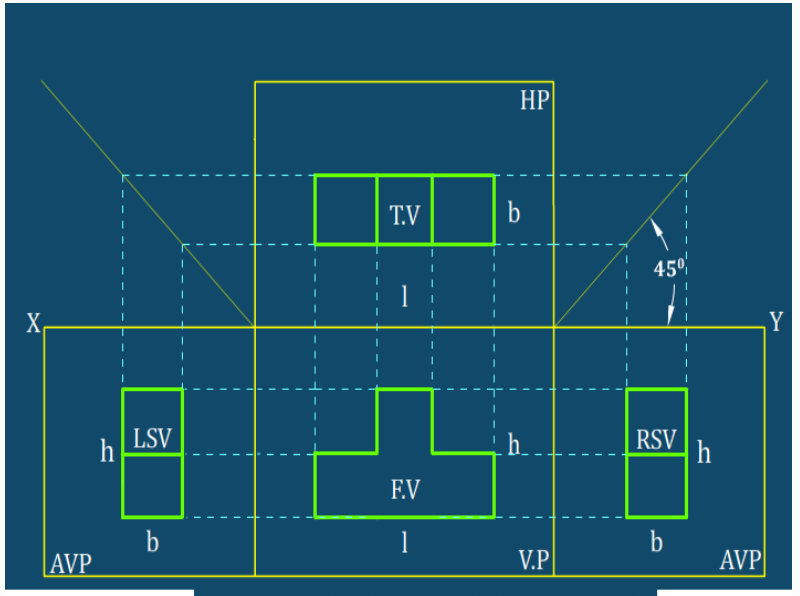


First Angle vs. Third Angle Projection

1ST ANGLE OF PROJECTION	3RD ANGLE OF PROJECTION
➢ The object is kept in the 1st quadrant.	➢ The object is assumed to keep in 3rd quadrant.
➢ The object lies in between the observer & the Plane of projection	➢ The plane of projection lies between the observer and the object.
➢ The plane of projection is assumed to be Non-transparent	➢ The plane of projection is assumed to be transparent
➢ In this method, when the views are drawn in their relative position, the plan comes below the FV/elevation or the TV drawn below the FV.	➢ In this method, when the views are drawn in their relative position, the plan comes above the elevation or TV is drawn above the FV.
➢ The left side view is drawn to the right side of the FV.	➢ The left side view is drawn to the left side of the FV.
➢ The right side view is drawn to the left side of the FV.	➢ The right side view is drawn to the right side Of the FV.
➢ This method of projection is used In European Countries & bureau of Indian standard is adopted w.e.f. 1981.	➢ This method of projection is used In U.S.A & other countries

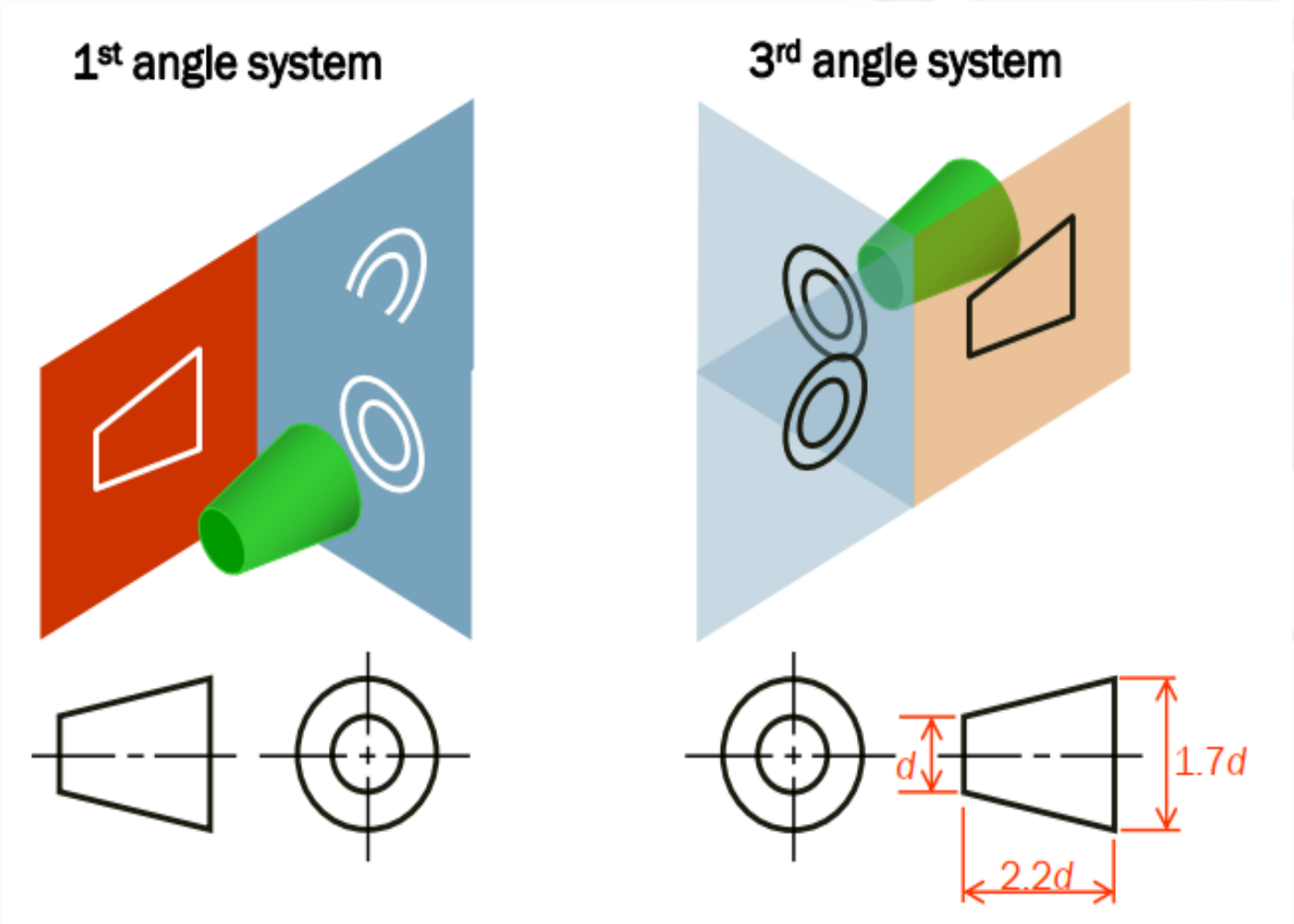


FIRST ANGLE PROJECTION LAYOUT



THIRD ANGLE PROJECTION LAYOUT

Projection Symbols



❖The front view & side view of a frustum of cone are used to show the symbol for projection method

Summary

- A projection is defined as representation of an object on a two dimensional plane. The following are the elements to be considered while obtaining a projection.

  The object

  The plane of projection

  The point of sight and

  The ray of sight

- When drawing the orthographic projection the following items should be invariable exist.

  The object to be projected.

  The projectors

  The plane of projection

  The observer's eye or station point

- 2ND & 4TH quadrant are not used since the FV & TV come(projected)on the same side of xy line & may overlap the view (FV & TV).so 2nd & 4th angles are not used In engineering drawing

Questions

- How do you explain Orthographic Projection?
- Why second and fourth angle projections are not used?
- Differentiate first and third angle projection on the basis of placement of different views with respect to reference plane

References

- Engineering Drawing by N. D. Bhatt and V. M. Panchal
- Engineering Graphics by K. C. John
- NPTEL

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Thank You

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